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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/903,300	07/11/2001	Jeffrey D. Harper	033257/207653	9981

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EXAMINER	
TRAN, NHAN T	

ART UNIT	PAPER NUMBER
2615	

DATE MAILED: 11/16/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/903,300	HARPER ET AL.	
	Examiner	Art Unit	
	Nhan T. Tran	2615	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *9/14/2005 & 8/15/2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-3,7,9,10,14,16-19,29-35,37-47 and 49-53* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3,7,9,10,14,16-19,29-35,37-47 and 49-53* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 9/14/2005 & 8/15/2005 has been entered.

Response to Arguments

2. Applicant's arguments with respect to claims 1-3, 7, 9, 10, 14, 16-19, 29-35, 37-47 & 49-53 have been considered but are moot in view of the new ground(s) of rejection.

Claim Objections

3. Claim 37 is objected to because of the recitation of "the device" in line 2 of the claim which should be changed to -- the bar code reader --. Also, "An bar code reader" in line 1 of the claim should be changed to -- A bar code reader --. Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claim 38 recites the limitation "the multi-tasked software-exclusive control routine" and "the exposure and gain setting" in lines 2-3 of the claims. There are insufficient antecedent basis for these limitations in the claim.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 37 & 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chu et al (US 5,702,059) in view of Kraemer et al (US 4,324,474).

Regarding claim 37, Chu discloses a bar code reader (Figs. 1-10) for capturing optical image data comprising:

an imager (40) for generating an image signal based on a bar code (see Fig. 2; col. 7, lines 41-56);

a memory component (memory 19 and/or inherent buffer in circuitry 18) that receives the image signal from the imager and stores the image signal as image data (see Fig. 2; col. 8, lines 43-45);

an operating system (whole system operated under microprocessor 16; Fig. 2) that implements a plurality of modules (40, 26, 20). See col. 7, lines 20-56, wherein modules 20 and

26 of circuitry 18 may be embodied in software resident in one or more RAM or ROM memory chips 19.

Chu further discloses that setting of the imager (e.g., exposure and/or gain at step 202 and a loop back before step 206 shown in Fig. 5) is adjusted before capturing an image of a bar code (step 206). See col. 13, line 21 – col. 14, line 19. It is clearly seen from disclosure of Fig. 5 that the adjustment of setting of the imager is **always** performed first **(at a high priority)**.

Although Chu suggests that the bar code reader may be operated under microprocessor 16 utilizing software programs stored in memory 19, Chu is *silent* about *a multi-tasking operating system* that places a higher priority on operations that adjust setting of the imager. **Kraemer** teaches an imaging apparatus running on a multi-tasking operation system which is inherently known as an operating system implementing a plurality of interrupt service routines in a time-sharing or time-divisional architecture to provide a sequence of priorities (i.e., priorities 1 to 7), wherein the first priority (highest priority) is assigned to exposure-related functions (i.e., exposure and/or gain setting) to reduce a latency period and avoid simultaneous conflicting commands. See Kraemer, Fig. 6; col. 5, lines 50-57 and col. 6, lines 13-31.

Therefore, it would have been obvious to one of ordinary skill in the art to modify the processor-based bar code reader in Chu to include a multi-tasking operation system that implements a plurality of imaging modules and places a higher priority on operations that adjust setting of the imager, i.e., exposure and gain settings, so as to immediately respond to exposure and gain adjustments for reducing a latency period and also to ovoid simultaneous conflicting commands as suggested by Kraemer.

Regarding claim 40, it is clearly seen that the multi-tasking operating system is controlled by a processor (processor 16 in Chu or CPU 50 in Kraemer) within the imaging device that executes all of the imaging device multi-tasking applications (see Chu, col. 7, lines 20-30 and Kraemer, col. 5, lines 50-57 and col. 6, lines 25-31).

6. Claims 1-3, 7, 9, 10, 18, 19, 29-35, 38, 39, 41-47, 49-53 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chu et al (US 5,702,059) and Kraemer et al (US 4,324,474) and in further view of Lewis (US 6,836,288 B1).

Regarding claim 38, see the analysis of claim 37 for combined teachings of Chu and Kraemer for the bar code reader constructed with a multi-tasking operating system, wherein the exposure and gain setting in the imager are controlled by a first software-exclusive module (interrupt service routine module for exposure-related functions). However, Chu and Kraemer do not explicitly teach *a second software-exclusive module* that implements computations in response to exposure data transmitted from the first software-exclusive module to determine a targeted exposure and gain setting.

As taught by Lewis, a memory (14a) stores a plurality of software-exclusive modules that are executed by a microprocessor (14) for controlling exposure and gain settings of an imager (Figs. 9a or 9b and col. 19, line 65 – col. 20, line 9). Lewis teaches that one *software-exclusive module* (Figs. 10(a) – 10(c)) is executed to control the exposure (i.e., SendShutter) and gain setting (i.e., SendGain) of the imager, and another *software-exclusive module* (Figs. 11(a) – 11(k)) is executed to implement computations in response to exposure data (i.e.,

GetLumaAverage) transmitted from said one software-exclusive module to determine a targeted exposure and gain setting for a next frame (see Lewis, col. 20, lines 9-46). The teaching of Lewis is to rapidly and smoothly adjust the desired exposure (electronic shutter and gain settings) of an imaging device by using software-exclusive modules (Lewis, col. 6, lines 28-37).

Therefore, it would have been obvious to one of ordinary skill in the art to configure the imaging apparatus in Chu and Kraemer to implement not only a first software-exclusive module for setting exposure and gain in the imager but also a second software-exclusive module for computations in response to exposure data transmitted from the first software-exclusive module to determine a targeted (desired) exposure and gain setting, thereby rapidly and smoothly adjusting the targeted exposure and gain setting as suggested by Lewis in col. 6, lines 28-37.

Regarding claim 39, Chu and Kraemer in view of Lewis also teaches that the second software-exclusive module implements computations in response to exposure data transmitted from the first software-exclusive module and image data transmitted from the memory component (see Lewis in col. 19, line 65 – col. 20, line 9 and Chu in Fig. 2).

Regarding claims 41-43, it is also clear that the first software-exclusive module is implemented in an interrupt service routine (Kraemer, col. 6, lines 25-31) which is inherently known as a high priority task or a high priority thread when the interrupt service routine is placed at a high priority, i.e., for exposure related functions.

Regarding claims 44 & 45, see the analyses of claims 37-43, wherein the first software-exclusive module is **always** implemented in highest priority task or interrupt service routine, and the second software-exclusive module is implemented in a lower priority task or thread routine in response to the exposure data transmitted from the first software-exclusive module.

Regarding claim 46, it is also seen that the combined teachings of Chu, Kraemer and Lewis implicitly renders the histogram processing module in Chu (module 26; Fig. 2) as the second software-exclusive module since the histogram processing module is implemented in response to the initial setting of exposure and gain data to the imager 40 as shown in step 202 and loop back before step 206 (see Chu, Fig. 5, col. 7, lines 20-30 and col. 9, lines 45-64).

Regarding claim 47, see the analyses of claims 43 & 45.

Regarding claim 49, see the analyses of claims 37 & 38, wherein Chu clearly discloses that the bar code reader captures an image of a two-dimensional (2D) barcode data symbol (see Chu, col. 1, lines 16-25), and a central processing unit is indicated by microprocessor 16 in Chu or CPU 50 in Kraemer. It is noted for this claim that "a second low-priority software exclusive module that recognizes and decodes the image data" is indicated by decoder 92 embodied in code operable by the microprocessor 16 (see Chu, col. 14, lines 20-45, wherein the decoder is always implemented in low priority because it is the last step for processing the image data after exposure, gain and histogram processing as analyzed above).

Regarding claim 50, it is also seen in Chu and Kraemer in view of Lewis that the multi-tasking operating system implemented by the CPU of the barcode imaging device further executes a third software-exclusive module (it is a histogram processing module for this claim) that performs calculations on the image data

Regarding claims 51 & 52, Chu and Kraemer in view of Lewis discloses that the first software-exclusive module is defined as controlling image exposure time (exposure period or shutter time). See Chu in Fig. 2 and Lewis in col. 20, lines 9-26. It should be noted that the exposure period or shutter time must synchronize with timing of the imager in order to function properly.

Regarding claim 53, Chu clearly discloses that the barcode imaging device is a portable barcode reader (see Chu, Fig. 10).

Regarding claim 1, see the analyses of claims 37, 38 & 46, wherein the histogram processing module is implemented as a low priority task that analyzes the image data and calculates a target contrast which is defined by the combination of exposure time and gain values, i.e., gray scale values (Chu, col. 9, lines 20-64 and/or Lewis, col. 5, lines 2-5).

Regarding claim 2, Chu clearly discloses that the imager generates the image signal from multi-dimensional symbologies (2D bar codes and matrix codes). See Chu, col. 1, lines 16-25.

Regarding claim 3, it is also seen that the multi-tasking operating system is a real-time operating system and wherein the imager control module is executed as a real-time thread. See Chu in Fig. 2 and col. 7, lines 20-30 and Kraemer in col. 6, lines 25-31, wherein all processes are executed in real time during capturing and analyzing the image data.

Regarding claims 7, 9 & 10, see the analyses of claims 41, 43 & 44, respectively.

Regarding claim 18, see the analyses of claims 37 & 38 and also note claim 3 for real time control of the imager.

Regarding claim 19, see the analyses of claims 37, 38, wherein the contrast is defined as the product of the exposure setting and gain setting. See Chu, col. 9, lines 20-64 and/or Lewis, col. 5, lines 2-5. It is importantly noted that an end of frame signal inherently generated in order for the imaging device to function as disclosed.

Regarding claim 29, see the analyses of claims 37, 38 and 19, wherein software program is stored in a memory device as disclosed by Chu, col. 7, lines 20-30 and/or Lewis, col. 19, line 65 – col. 20, line 9.

Regarding claim 30, see the analyses of claims 37, 38, 43 & 19, wherein a captured contrast setting is defined as a captured exposure and gain settings (see Chu, loop back between steps 204 and 206 in Fig. 5) in response to the end of frame generated at step 204.

Regarding claims 31 & 32, see the analysis of claim 30 and note that interrupt service routine module is also a high priority thread module or a high priority task module when the interrupt service routine is placed at a high priority, i.e., for exposure related functions as analyzed in claims 41-43.

Regarding claims 33-35, see the analyses of claims 19, 29 and 44-46, wherein the low priority module is the histogram module (the second software-exclusive module) for calculating target contrast setting in response to the end of frame image signal from the imager, the captured contrast setting and stored image data further comprising calculating in a low priority task module or low priority thread module (for a next frame).

7. Claims 14, 16 & 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chu et al, Kraemer et al and Lewis as applied to claim 1 and in further view of Feng (US 6,062,475).

Regarding claim 14, Chu, Kraemer and Lewis do not specifically teach a Direct Memory Access (DMA) controller that receives the image signals from the imager, responds to an image capture command from the second software-exclusive module and transfers captured image signals into the memory component. As taught by Feng, Direct Memory Access controller (275) is utilized in a bar code reader for transferring captured image signals into memory (274) in response synchronized and clock signals during capturing an image. See Feng, Figs. 29A & B; col. 21, lines 23-30.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify imaging device in combined Chu, Kraemer and Lewis to include DMA controller taught by Feng for transferring the image signals directly into the memory in response to image capture command without going through the microprocessor so that workload on the microprocessor is reduced, thereby speeding image processing.

Regarding claim 16, as shown in Fig. 29A in Feng, DMA controller is inherently a programmable logic device that serves as an interface between the imager and the processor.

Regarding claim 17, see the analyses of claims 14 & 16.

Conclusion

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nhan T. Tran whose telephone number is (571) 272-7371. The examiner can normally be reached on Monday - Thursday, 7:30am - 5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Ometz can be reached on (571) 272-7593. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

NT.

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